are eliminated. When the air and gas are heated to the temperature of the jet of flame, which may have a temperature of 1500° to 1600°, the ingots being heated are liable to be burned if exposed to the impinging action of the gases.

This assumes that the producer gas and the air are mixed outside of the heating chamber of the furnace.

(c) In order to prevent the melted cinder from flowing into the ports of the furnace the hearth is given a slight drainage slope from both ends to the center of the hearth. The port sills are cooled by inverted troughs immediately below the bridge wall, through

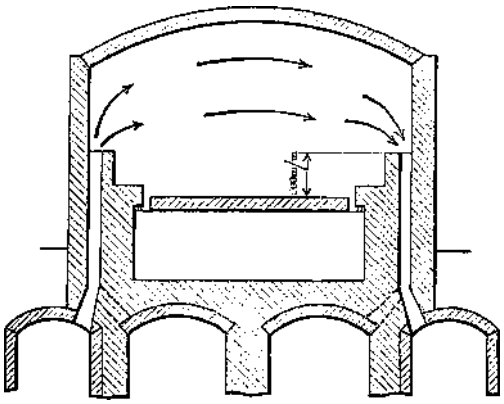

FIG. ill.

which a forced circulation of cold air is obtained by chimney suction.

A very interesting example of the complete neglect of all the fundamental principles of rational furnace construction is found in a Siemens type furnace for carbonizing and tempering armor plate, according to the KruppW system. This furnace is a backward step in design and construction.

It may be seen in Fig. Ill that the vertical heads of the Siemens furnace are elevated 800 mm above the hearth of the furnace. The armor plate to be heated was placed upon a car supported above its deck by short brick columns, and then run into the furnace. It was found, nevertheless, to be within a pocket of chilled gases, which could nob be drained away from the

[1] This refers to the Russian works using the Krupp system.